REMARKS

Claims 1-21 are all the claims pending in the application. By this Amendment, Applicant amends claims 1, 6, and 10 to further clarify the invention. In addition, Applicant rewrites claim 11 into its independent form. Claim 21 is newly presented and is clearly supported throughout the specification.

I. Preliminary Matters

As preliminary matters, the Examiner did not list references, U.S. Patent No. 7,158,723 to Wan et al. and U.S. Patent No. 7,177,541 to Chung et al., on form PTO-892 of the current pending Office Action. Applicant respectfully requests the Examiner to list these references on form PTO-892 and provide a copy to the Applicant with the next Office Communication.

II. Summary of the Office Action

The Examiner withdrew the previous grounds of rejection. The Examiner, however, found new grounds for rejecting the claims. Specifically, claim 10 is rejected under 35 U.S.C. § 112, first paragraph, claims 1, 3, 11, and 14 are rejected under 35 U.S.C. § 102, and claims 1-20 are rejected under 35 U.S.C. § 103(a).

III. Claim Rejections Under 35 U.S.C. § 112

Claim 10 is rejected under 35 U.S.C. § 112, first paragraph. Applicant respectfully traverses these grounds of rejection in view of the following comments.

The Examiner states that claim 10 recites a computer readable medium storing a program for performing a method, and that this feature is not taught in the specification of the current application. Applicant respectfully disagrees.

MPEP § 2161 states:

> The specification must contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same.

In the present case, Applicant respectfully directs the Examiner to page 6, lines 15-16 of the specification, which states that "the invention is also realized in a software program for performing the method described above." Applicant further notes that the original claim 10 recited a software program for performing the method of claim 6. In other words, the specification, along with the original claim 10, provides ample support for the above-noted unique features of claim 10. That is, software programs are software embodied on some sort of computer-readable medium so that they can be implemented by a processor. One of ordinary skill in the art would readily understand that the software program discussed in the specification is embodied on a computer readable medium such as an exemplary receiver described in the specification. Therefore, Applicant respectfully requests the Examiner to withdraw the 35 U.S.C. § 112 rejection of claim 10.

IV. Claim Rejections 35 U.S.C. § 102

Claims 1, 3, 11 and 14 are rejected under 35 U.S.C. § 102(b) as being anticipated by EP 0996243 to Van den Bergh et al. (hereinafter EP '243). Applicant respectfully traverses these grounds of rejection at least in view of the following comments.

This response at least initially focuses on exemplary features of claim 1. Claim 1 recites *inter alia*:

> wherein the split parts of the optical signal are fed into said at least two waveguide branches,
>
> wherein each waveguide branch comprises a different optical filtering element…

The Examiner' alleges that claim 1 is anticipated by the device depicted in Figure 2 of EP '243, which illustrates a power splitter means 5, λ-dependent attenuator 7, photodiodes 8, A/D converters 11, and a digital signal processor 12 (*see* page 3 of Office Action dated May 10, 2007). Applicant respectfully disagrees.

EP '243 teaches of a method for monitoring an optical network, which is equipped with Wavelength Division Multiplexing (WDM) equipment (EP '243; page 2, lines 3-4). As shown in figure 2 of EP '243, a transmission line 1 carrying several data channels of different wavelengths is supplied to the power splitter means 5, which couples out part of the signal (EP '243; page 3, lines 49-51). The remaining signal part is passed through the 1 to 2 splitter 6 creating two signals (EP '243; page 3; lines 49-51). **One signal is provided to a λ-dependent attenuator 7**, which the Examiner alleges is an optical filter, then to a photodiode 8, and **the other signal is provided directly to a different photodiode 8** (EP '243; page 3, lines 49-53; Figure 1; page 3 of Office Action date May 10, 2007). Next, each signal is supplied to an amplifier 9 then to respective A/D converters, which passes both signals to the same DSP 12 (EP' 243; Figure 2; page 3, lines 57-58).

Because EP '243 teaches that one portion of the optical signal is provided to a λ-dependent attenuator and the other portion is provided directly to a photodiode, EP '243 does not teach "wherein the split parts of the optical signal are fed into said at least two waveguide branches, wherein **each waveguide branch comprises a different optical filtering element**" as recited in claim 1. That is, EP '243 does not disclose each branch containing a different optical filtering element. Therefore, EP '243 does not anticipate claim 1.

For at least these exemplary reasons, claim 1 and its dependant claims 3 and 14 should be deemed allowable.

Claim 11 recites *inter alia*:

> the first waveguide branch does not have the optical filtering element and the DSP processing unit analyzes the first split part for intensity information of the whole optical signal, and
>
> the second waveguide branch comprises the optical filtering element and the DSP processing unit analyzes the second split part for information specific to only the second split part of the optical signal

As described above with reference to figure 2 of EP '243, once the signals are provided to the DSP 12, the DSP 12 calculates the probability density of the discrete power levels of the data channels resulting in a probability density function (EP '243; page 4, lines 11-13). The Gaussian channel parameters are extracted from the probability density function (EP '243; page 4, lines 13-15). These Gaussian channel parameters are then used to produce monitor information for the optical network (EP '243; page 4, lines 15-16).

Because EP '243 discloses only using a DSP to determine Gaussian channel parameters for data channels in an optical network, EP '243 does not teach of a DSP that analyzes "the first split part for intensity information of the whole optical signal" and "the second split part for information specific to only the second split part of the optical signal" as recited in claim 11. That is, EP '243 does not teach of analyzing split signals for different measurements using a DSP. Instead EP '243 teaches of analyzing an entire signal to determine the Gaussian channel parameters for use in monitoring the optical network. Therefore, EP '243 does not anticipate claim 11 and should be deemed allowable.

Applicant respectfully requests that the Examiner withdraw the 35 U.S.C. § 102(b) rejection of claims 1, 3, 11, and 14.

V. Claim Rejections 35 U.S.C. § 103

Claims 1-3 and 12-14 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,707,963 to Kawarai (hereinafter "Kawarai") in view of U.S. Patent No. 7,068,949 to Jung et al. (hereinafter "Jung") and U.S. Patent No. 7,158,723 to Wan et al. (hereinafter "Wan").[1] Applicant respectfully traverses these grounds of rejection at least in view of the following comments.

Applicant respectfully submits that claim 2 is not pending in the Application. Accordingly, the rejection of claim 2 is moot.

This response at least initially focuses on exemplary features of claim 1. Claim 1 recites *inter alia*:

> a splitting unit splitting the optical signal received by the receiver input;
> . . .
> wherein each waveguide branch comprises a different optical filtering element,
> wherein each waveguide branch is fed onto a separate photo diode,
> wherein the signal of each photo diode is fed into a separate ADC unit

The Examiner alleges that Kawarai teaches claim 1 except for the use of a digital signal processor and A/D converters (*see* page 3 of Office Action dated May 10, 2007). The Examiner further alleges that Jung teaches of using an A/D converter with a digital signal processor, and Wan teaches of a plurality of A/D converters (*see* page 3 of Office Action dated May 10, 2007). The Examiner believes that one skilled in the art would have been motivated to combine the Kawarai, Jung, and Wan rendering claim 1 obvious (*see* page 3-4 of Office Action dated May 10, 2007). Applicant respectfully disagrees.

[1] The Examiner did not list this reference on the PTO-892 attached to the Final Office Action.

Kawarai teaches of a wavelength division multiplexing (WDM) apparatus, which **combines a plurality of optical signals** of different wavelengths and amplifies the composite signal (Kawarai; column 1, lines 11-14). Referring to figure 2 of the Kawarai reference, several optical signals of different wavelengths are supplied to corresponding transponders (TPs) 20 (Kawarai; column 3, lines 37-40). The signals from the TPs 20 are then supplied to the optical variable attenuators 12, which are contained in the optical variable attenuation section (VAT) 10 (Kawarai; column 3, lines 20-25). The outputs of the optical variable attenuators 12 are then **combined** in the transmitting wave multiplexer (TWN) 14 and amplified by the transmitting wave amplifier (TWA) 16 (Kawarai; column 3, lines 25-28). Referring to figure 6 of the Kawarai reference, the wavelength locker 26 of a TP 20 is depicted (Kawarai; column 4, lines 14-15). The wavelength locker 26 monitors the wavelength of the optical signal (Kawarai; column 3, lines 55-57). When one of the optical signals is supplied to the TP 20, **a sample of the signal is provided to optical filters 36 and 38** and subsequently detected by photodiodes 40 and 42 (Kawarai; column 4, lines 15-18). The photodiodes then provide detection results to the calculation unit 44 (Kawarai; column 4, lines 18-19).

Kawarai does not disclose "a splitting unit **splitting the optical signal received by the receiver input**" as recited in claim 1. Instead Kawarai discloses a method for **combining** a plurality of optical signals of different wavelengths and providing a sample of that signal to a wavelength locker for monitoring the wavelengths of the optical signals, where sampling is obtaining the value of a signal at a given time. That is, Kawarai does not disclose or suggest **splitting the optical signal** and providing the different portions of the split signals to different waveguide branches that have **different optical filtering element**, as set forth in claim 1.

Applicants have demonstrated that Kawarai does not meet all the requirements of independent claim 1. Jung is relied upon only for its teaching of using a DSP with an A/D converter. Clearly, Jung does not compensate for the above-identified deficiencies of Kawarai. In addition, Wan is relied upon only for its teaching of using multiple A/D converters and as such also does not compensate for the above-identified deficiencies of the Kawarai reference. Together, the combined teachings of these references would not have (and could not have) led the artisan of ordinary skill to have achieved the subject matter of claim 1. For at least the above reasons, claim 1 and its dependant claims 3 and 12-14 should be deemed allowable.

Accordingly, Applicant respectfully requests that the Examiner to withdraw the 35 U.S.C. § 103(a) rejection of claims 1-3 and 12-14.

Claims 1, 3, 5, 11, and 14 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No, 7,177,541 to Chung et al. (hereinafter "Chung")[2] in view of U.S. Patent No. 6,714,741 to Van de Bergh et al. (hereinafter "Van de Bergh"). Applicant respectfully traverses these grounds of rejection at least in view of the following comments.

This response at least initially focuses on exemplary features of claim 1. Claim 1 recites *inter alia*:

> wherein the split parts of the optical signal are fed into said at least two waveguide branches,
>
> wherein each waveguide branch comprises a different optical filtering element,
>
> wherein each waveguide branch is fed onto a separate photo diode

The Examiner alleges that Chung teaches claim 1 except for providing more than one A/D converter (*see* page 4 of Office Action dated May 10, 2007). The Examiner further alleges that

[2] The Examiner did not list this reference on the PTO-892 attached to the Final Office Action.

Van de Bergh teaches two A/D converters (*see* page 4 of Office Action dated May 10, 2007). The Examiner believes one skilled in the art would have been motivated to combine the Chung and Van de Bergh thus rendering claim 1 obvious (*see* page 4 of Office Action dated May 10, 2007). Applicant respectfully disagrees.

Chung teaches a method for optical signal-to-noise ration (OSNR) monitoring for optical networks (Chung; column 1, lines 5-14). Referring to Figure 2 of Chung, an optical signal is split by the 1:1 directional coupler 10, which separates signals based on the direction of the signal's propagation (Chung; column 3, lines 37-41). The first portion of the optical signal is provided directly to a photodector 30a and amplified by a logarithmic amplifier 40a (Chung; column 3, lines 42-44). The first portion of the optical signal is then converted into a digital signal by A/D converter 50 and provided to the computer 60 (Chung; column 3, lines 44-45).

The second portion of the signal is first provided to an optical filter 20 then to a photodector 30b (Chung; column 3, lines 45-47). From the photodector 30b, the second portion of the optical signal is provided to a logarithmic amplifier 40b then converted to a digital signal by A/D converter 50 (Chung; column 3; lines 47-49). From the A/D converter, the second portion of the optical signal is provided to the computer 60 so that it can calculate the optical signal-to-noise ratio for the optical signal (Chung; column 3, lines 49-51). Chung does not teach "wherein **each** waveguide branch comprises a different optical filtering element" as recited in claim 1. Instead, Chung teaches of a system where one branch contains a filter **while the other branch does not**. That is, Chung does not disclose providing filtering elements in both branches. Therefore, Chung does not teach all of the elements of claim 1.

Van de Bergh does not cure the deficiencies of Chung. As previously stated, because one portion of the optical signal is provided to a λ-dependent attenuator and the other portion is

provided directly to a photodiode in Van de Bergh, Van de Bergh does not teach "wherein the split parts of the optical signal are fed into said at least two waveguide branches, wherein **each waveguide branch comprises different optical filtering element**" as recited in claim 1. Therefore, the Examiner has not established a *prima facie* case for obviousness based on the notion that one skilled in the art would have found the invention set forth in claim 1 obvious based on Chung in view of Van de Bergh.

For at least the above exemplary reasons, claim 1 and its dependant claims 3, 5, and 14 should be deemed allowable.

Claim 11 recites *inter alia*:

> wherein the first waveguide branch comprises the optical filtering element and the DSP processing unit analyzes the first split part for intensity information of the whole optical signal, and
> wherein the second waveguide branch comprises the optical filtering element and the DSP processing unit analyzes the second split part for information specific to only the second split part of the optical signal

Referring again to Figure 2 of Chung, once the optical signal is provided to the computer 60, the computer 60 analyzes the entire optical signal to calculate the optical signal-to-noise ratio (OSNR), which is defined as the ratio of signal power to noise power contained over the optical signal band (Chung; column 1, lines 25-26; column 3, lines 51-52).

Because Chung requires analysis of the **entire** optical signal to calculate the OSNR, Chung does not teach or suggest a "DSP processing unit analyzes the first split part for intensity information of the whole optical signal" nor a "DSP processing unit analyzes the second split part for information specific to only the second split part of the optical signal" as recited in claim 11. That is, Chung analyzes the entire optical signal in the computer. Therefore, Chung does not disclose the elements of claim 11. Accordingly, claim 11 should be deemed allowable.

Applicant respectfully requests that the Examiner to withdraw the 35 U.S.C. § 103(a) rejection of claims 1, 3, 5, 11, and 14.

Claims 1-3, 5-8, 10, 12-17, 19 and 20 are rejected under 35 U.S.C. § 103(a) as being unpatentable over A. Lima et al., "Polorization Diversity and Equalizaiton for PMD Mitigation in Optical Communication Systems", IEEE International Conference on Acoustics, Speech, and Signal Processing, May 13-17, 2002 (hereinafter "Lima") in view of U.S. Publication No. 2002/0012152 to Agazzi et al. (hereinafter "Agazzi"). Applicant respectfully traverses these grounds of rejection at least in view of the following comments.

Applicant respectfully submits that claim 2 is not pending in the Application. Accordingly, the rejection of claim 2 is moot.

This response at least initially focuses on exemplary features of claim 1. Claim 1 recites *inter alia*:

> at least two waveguide branches,
> wherein the split parts of the optical signal are fed into said at least two waveguide branches,
> wherein each waveguide branch comprises a different optical filtering element,
> wherein each waveguide branch is fed onto a separate photo diode,
> wherein the signal of each photo diode is fed into a separate ADC unit,
> wherein the signal of each ADC unit is fed into the DSP processing unit
> wherein different types of filtering process are executed in each waveguide branch

The Examiner alleges that Lima teaches all of claim 1 except for the A/D converters (*see* page 5-6 of Office Action dated May 10, 2007). The Examiner further alleges that Agazzi teaches of using an A/D converter and a DSP for processing optical data signals (*see* page 6 of Office Action dated May 10, 2007). The Examiner believes one skilled in the art would be motivated to

combine the Lima and Agazzi thus rendering claim 1 obvious (*see* page 6 of Office Action dated May 10, 2007). Applicant respectfully disagrees.

Lima teaches of a method of improving performance gains by mitigating polarization mode dispersion (PMD) by using a receiver with polarization diversity (Lima; page 2721). Lima teaches that the polarization diversity receiver, depicted in Figure 1 of Lima, receives an incoming signal, which is equally split into three pairs of orthogonal polarizations (Lima; page 2722). The **first and third pairs** are provided to linear polarization beam **splitters** (LPBS), which split the signals by vertical and horizontal polarizations (Lima; page 2722). The second pair is applied to a quarter-wave plate, which is a filter that converts the signal from circular to linear polarization, and then applies that signal to the polarization beam **splitter** (PBS) (Lima; page 2722). From the LPBSs and PBS, the signals are applied to photodetectors, and then to corresponding combiner/equalizers, which combine the three pairs of signals (Lima; page 2722).

Because Lima does not provide different filtering in each branch of the polarization diversity receiver, Lima does not teach or suggest "wherein **different types of filtering process** are executed in each waveguide branch" as recited in claim 1. That is, Lima teaches of a first and third signal, which are directly provided to splitters, and a second signal, which is provided to a quarter-wave plate then to a split. Therefore, Lima does not disclose the elements of claim 1.

Applicants have already demonstrated that Lima do not meet all the requirements of independent claim 1. Agazzi is relied upon only for its teaching of using an ADC and a DSP (*see* page 6 of Office Action dated May 10, 2007). Clearly, Agazzi does not compensate for the above-identified deficiencies of Lima. Accordingly, claim 1 should be deemed allowable.

For at least the above exemplary reasons, claim 1 and its dependant claims 3, 5, and 12-14 should be deemed allowable. To the extent that independent claims 6 and 10 recite similar elements, claims 6 and 10 and their dependent claims 7 and 8 should be deemed allowable.

Claim 11 recites *inter alia*:

> wherein the first waveguide branch comprises the optical filtering element and the DSP processing unit analyzes the first split part for intensity information of the whole optical signal, and
> wherein the second waveguide branch comprises the optical filtering element and the DSP processing unit analyzes the second split part for information specific to only the second split part of the optical signal

Referring to Figure 1 of Lima, Lima teaches that once the signal pairs are combined by the combiner/equalizers, the power margin of each signal pair is calculated and a determination is made of which branch has the maximum power margin (Lima; page 2722). Because Lima requires that the **entire signal** be analyzed to calculate the power margin of each branch, Lima does not teach or suggest a DSP that analyzes "the first split part for intensity information of the whole optical signal" and "the second split part for information specific to only the second split part of the optical signal" as recited in claim 11. Therefore, Lima does not disclose the elements of claim 11, and claim 11 should be deemed allowable.

Claims 15 and 20 recite *in some variation* and *inter alia*:

> wherein the DSP processing unit is configured to correlate information of all waveguide branches to determine one of most likely transmitted bit pattern of the optical signal and numbers for the probability of 0 and 1 in the transmitted bit pattern of the optical signal

As previously described, Lima analyzes the entire signal **to calculate the power margin** of each signal pair from each branch, and determines which branch has the maximum power margin (Lima; page 2722). Lima does not disclose or suggest "wherein the DSP processing unit is configured to correlate information of all waveguide branches to **determine one of most**

likely transmitted bit pattern of the optical signal and numbers for the probability of 0 and 1 in the transmitted bit pattern of the optical signal. Instead Lima discloses calculation of power margin for each signal pair. That is, Lima discloses calculating the difference between available signal power and the minimum signal power, which is the power margin of the signal. Therefore, Lima does not disclose of suggest the elements of claims 15 and 20. For at least the above exemplary reasons, claims 15 and 20 and their dependant claims 16, 17, and 19 should be deemed allowable.

Applicant respectfully requests that the Examiner withdraw the 35 U.S.C. § 103(a) rejection for claims 1-3, 5-8, 10, 12-17, 19, and 20.

Claims 4 and 18 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Lima and Agazzi, and further in view of U.S. Patent No. 6,559,756 to Al-Araji et al. (hereinafter "Al-Araji"). Applicant respectfully traverses these grounds of rejection at least in view of the following comments. Claims 4 and 18 depend on claims 1 and 15. Applicants have already demonstrated that Lima and Agazzi do not meet all the requirements of independent claims 1 and 15. Al-Araji is relied upon only for its teaching of a DSP circuit that is implemented with a field programmable gate array (FPGA). Clearly, Al-Araji does not compensate for the above-identified deficiencies of Lima and Agazzi. Accordingly, claims 4 and 18 are patentable at least by virtue of their dependency on claims 1 and 15.

Further, Applicant respectfully submits that Al-Araji is not analogous art. In order to rely on a reference as a basis for rejection of an applicant's invention, the reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the inventor was concerned. MPEP 2141.01(a). Al-Araji is concerned with an **ingress monitoring device** in a broadband communications system, which requires analysis of

an RF signal (Al-Araji; column 1, lines 6-9; column 5, liens 53-55). In other words, Al-Araji does not address optical signal transmission and as such is in a different field of endeavor. Furthermore, Al-Araji addresses the problem of monitoring unwanted ingress, or noise within a transmitted signal (Al-Araji; column 1, lines 5-10, 62-65). Since Al-Araji does not address the problem of recovering information that is transmitted via optical signals or light waves and is not directed to the field of optical signals, it is non analogous art. For at least these additional reasons, claims 4 and 18 are patentable over Lima, Agazzi, and Al-Araji.

Applicant respectfully requests that the Examiner withdraw the 35 U.S.C. § 103(a) rejection for claims 4 and 18.

Claim 9 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Lima and Agazzi, and further in view of U.S. Publication No. 2004/0017857 to Chouly et al. (hereinafter "Chouly"). Applicant respectfully traverses these grounds for rejection in view of the following comments.

Claim 9 depends on claim 6. Applicants have already demonstrated that Lima and Agazzi do not meet all the requirements of independent claim 6. Chouly is relied upon only for its teaching of a MAP algorithm (*see* page 8 of Office Action dated May 10, 2007). Clearly, Chouly does not compensate for the above-identified deficiencies of Lima and Agazzi. Accordingly, claim 9 is patentable at least by virtue of their dependency on claim 6.

Applicant respectfully requests that the Examiner withdraw the 35 U.S.C. § 103(a) rejection for claim 9.

VI. New Claims

In order to provide more varied protection, Applicant adds claim 21, which is patentable at least by virtue of its dependency on claim 11 and for additional features set forth therein.

VII. Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned attorney at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

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